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JUNE 1985

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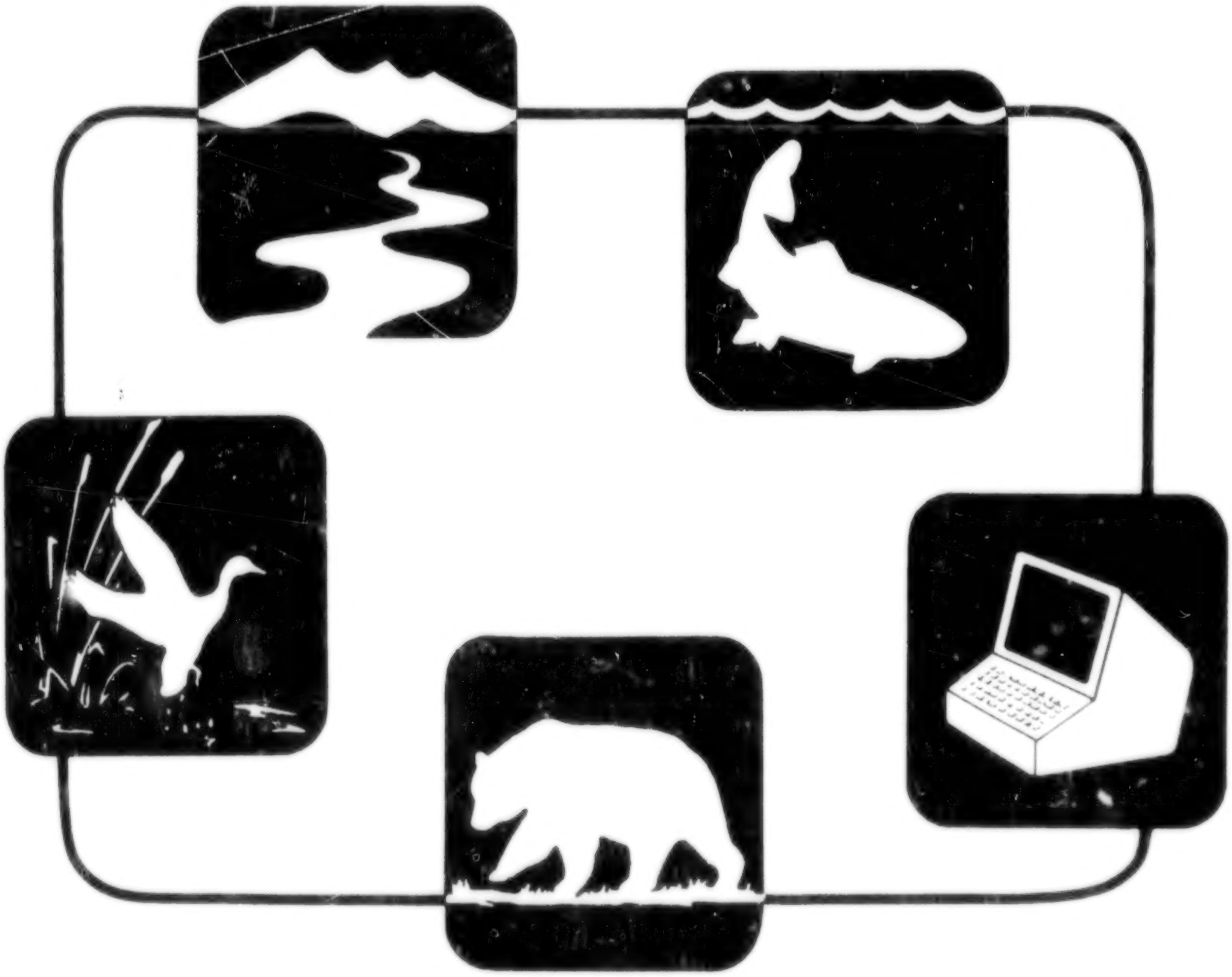
FWS/OBS SERIES ANNOTATED BIBLIOGRAPHY: WESTERN ENERGY AND LAND USE TEAM PRODUCTS



Fish and Wildlife Service

U.S. Department of the Interior

This is one of the first reports to be published in the new "Biological Report" series. This technical report series, published by the Research and Development branch of the U.S. Fish and Wildlife Service, replaces the "FWS/OBS" series published from 1976 to September 1984. The Biological Report series is designed for the rapid publication of reports with an application orientation, and it continues the focus of the FWS/OBS series on resource management issues and fish and wildlife needs.

Biological Report 85(13)
June 1985

FWS/OBS SERIES ANNOTATED BIBLIOGRAPHY:
WESTERN ENERGY AND LAND USE TEAM PRODUCTS

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INTRODUCTION

This bibliography contains entries for all publications produced by the U.S. Fish and Wildlife Service (FWS) Western Energy and Land Use Team (WELUT) that are part of the FWS/OBS report series. This series was initiated in 1976 when WELUT was part of the Office of Biological Services (OBS), hence, the designation "FWS/OBS". Offices formerly in the OBS are now part of the Division of Biological Services, Research and Development. In October 1984, the FWS/OBS series was replaced by the Biological Report series. This bibliography thus serves as the final record of all WELUT products in the FWS/OBS series. Questions regarding WELUT products should be addressed to:

Information Management Services
Western Energy and Land Use Team
Fish and Wildlife Service
2627 Redwing Road
Fort Collins, CO 80526-2899
(303) 226-9300 or FTS 323-5300.

ARRANGEMENT OF ANNOTATIONS

Entries are arranged by FWS/OBS number. The first two digits usually pertain to the year of publication or the year in which a subseries was initiated. (See, for example, the 82/10 series.) Basic bibliographic information and a brief annotation are included for each publication. In several cases, a single annotation has been used to describe a group of similar publications or a subseries. These "series" abstracts are indicated by asterisks (see, for example, page 9).

INDEXES

The keyword-in-title index used here contains significant subject and geographical terms used in each publication's title. Major subseries names, i.e., the Habitat Suitability Models and the Instream Flow Information Papers, have also been listed.

The author index, which begins on page 34, includes primary and subsequent authors.

AVAILABILITY INFORMATION

The indexes are followed by availability information. An "X" or a stock number in the columns labelled "WELUT", "NTIS", and "GPO" indicate that a particular publication is available from that source. All publications available from WELUT may be requested, without charge, from Information Management Services at the address given above. Publications available from the Government Printing Office (GPO) may be obtained by contacting:

Superintendent of Documents
Government Printing Office
Washington, DC 20402
(202) 783-3238.

They may also be available from any of the regional GPO bookstores. Costs will vary, but are generally less than for the same publication from the National Technical Information Service (NTIS).

Photocopies of all WELUT reports in the FWS/OBS series are available from NTIS. Prices can be determined by referring to the following table, which relates publication length, i.e., pages, to cost.

Standard priced documents and microfiche.

Price code	Page range	Price	Price code	Page range	Price
A01	Microfiche	$ 4.50	A14	301 - 325	$25.00
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[a] Add \$1.50 for each additional 25-page increment, or portion thereof.

Publications can be obtained from:

National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650 or FTS 737-4650.

BIBLIOGRAPHY

FWS/OBS-76/01.1. WILDLIFE AND OIL SHALE: A PROBLEM ANALYSIS AND RESEARCH PROGRAM: VOLUME 1. Hubert D. Burke. 1975. 100 pp.

This publication analyzes the probable consequences of oil shale development in Colorado, Utah, and Wyoming. Research about the natural and social environment of the Rocky Mountain oil shale region was reviewed. Ten "priority studies" are outlined and recommended, and suggestions for mitigation of undesirable impacts are given.

FWS/OBS-76/01.2. WILDLIFE AND OIL SHALE: A PROBLEM ANALYSIS AND RESEARCH PROGRAM: VOLUME 2 - APPENDIX AND BIBLIOGRAPHY. Hubert D. Burke. 1975. 131 pp.

This publication provides references for use with Volume 1 (FWS/OBS-76/01.1).

FWS/OBS-76/03. METHODOLOGIES FOR THE DETERMINATION OF STREAM RESOURCE FLOW REQUIREMENTS: AN ASSESSMENT. Clair B. Stalnaker and J. L. Arnett. 1976. 199 pp.

A workshop on instream flows resulted in instream flow methodology developments in the areas of fisheries, wildlife, water quality, recreation, and aesthetics. Each area is described in a separate report section.

FWS/OBS-76/04. FISH AND WILDLIFE IMPLICATIONS OF UPPER MISSOURI BASIN WATER ALLOCATION: A RESEARCH ASSESSMENT. William B. Lord et al. 1975. 114 pp.

Research opportunities regarding energy development impacts on fish and wildlife resources in the Upper Missouri River Basin are evaluated with emphasis on water allocation changes. Recommendations for mitigating potential problems are included.

FWS/OBS-76/10. A SELECTED ANNOTATED BIBLIOGRAPHY ON FISH AND WILDLIFE IMPLICATIONS OF MISSOURI WATER ALLOCATION. Anita Cochran. 1975. 71 pp.

Contains references useful to those dealing with the management of water allocation within the Upper Missouri River Basin. The subject matter encompasses biological sciences, engineering, geology, law, and the social sciences.

FWS/OBS-76/28. ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE, PART A: ROCKY MOUNTAINS AND PACIFIC NORTHWEST. Wayne Nelson et al. 1976. 14 pp.

The report FWS/OBS-76/29 is summarized here, and recommendations for improving the process of instream flow reservation and implementation are discussed.

FWS/OBS-76/29 to 76/34. This series of publications deals with flow conditions below 142 dams and diversions in the Rocky Mountains, the Pacific Northwest, and California. Findings, analysis, conclusions, and recommendations are included regarding changed flow regimes below dams, impacts on fisheries, and methodologies used to assess flow requirements.

FWS/OBS-76/29. ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE, PART A: ROCKY MOUNTAINS AND PACIFIC NORTHWEST, FINAL REPORT. Wayne Nelson et al. 1976. 120 pp.

FWS/OBS-76/30. ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE, PART A: ROCKY MOUNTAIN REGION CASE STUDIES. Wayne Nelson et al. 1976. 373 pp.

FWS/OBS-76/31. ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE, PART A: PACIFIC NORTHWEST REGION CASE STUDIES. Wayne Nelson et al. 1976. 398 pp.

FWS/OBS-76/32. ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE, PART B: CALIFORNIA, EXECUTIVE SUMMARY. Charles Hazel. 1976. 20 pp.

FWS/OBS-76/33. ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE, PART B: CALIFORNIA, FINAL REPORT. Charles Hazel. 1976. 65 pp.

FWS/OBS-76/34. ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTICS ON FISH AND WILDLIFE, PART B: CALIFORNIA CASE STUDIES. Charles Hazel. 1976. 611 pp.

FWS/OBS-76/36. GEOTHERMAL HANDBOOK. Bill Spaulding. 1976. 194 pp.

This report, intended as a working tool for the field, discusses the basic geologic, physical, and chemical characteristics of geothermal resources; the probable locations of future developments in the West; environmental assessment procedures; and means of wildlife compensation and habitat improvements.

FWS/OBS-76/37. GUIDELINES FOR LINE TRANSECT SAMPLING OF BIOLOGICAL POPULATIONS. David R. Anderson. 1976. 28 pp.

This publication, directed at field biologists and biological technicians, provides guidelines for designing and conducting field surveys to estimate the size or density of biological populations using the line transect sampling method.

FWS/OBS-77/04. ENERGY, PUBLIC CHOICES AND ENVIRONMENTAL DATA NEEDS. Frank M. Graves. 1977. 61 pp.

This publication outlines the decisionmaking process of several Federal and State agencies relative to energy developments and fish and wildlife resources in coal and oil shale areas of the West.

FWS/OBS-77/05. GUIDE TO LAND COVER AND USE CLASSIFICATION SYSTEMS EMPLOYED BY WESTERN GOVERNMENTAL AGENCIES. Scott L. Ellis. 1977. 184 pp.

This publication surveys 75 systems presently in use by Federal and State agencies in 16 western States and 2 provinces of Canada. The focus is on systems classifying wildlife, land use, and terrestrial vegetation.

FWS/OBS-77/09. THE ECOLOGICAL EFFECTS OF COAL STRIP-MINING: A BIBLIOGRAPHY WITH ABSTRACTS. Sally Ralston et al. 1977. 416 pp.

This bibliography contains annotated entries on the ecological effects of coal strip-mining in the West, especially the Northern Great Plains. Part I contains citations and abstracts. Part II is an extensive "Key Word in Title" index.

FWS/OBS-77/10. DIRECTORY OF EXISTING NATURAL RESOURCE AGENCY MANUALS AND HANDBOOKS. Thorne Ecological Institute. 1977. 61 pp.

Superseded by FWS/OBS-78/22.

FWS/OBS-77/19. GUIDELINES FOR PREPARING EXPERT TESTIMONY IN WATER MANAGEMENT DECISIONS RELATED TO INSTREAM FLOW ISSUES. IFIP No. 1. Berton Lee Lamb. 1977. 42 pp.

Superseded by FWS/OBS-79/37.

FWS/OBS-77/20. AN ENVIRONMENTAL GUIDE TO WESTERN SURFACE MINING, PART I: FEDERAL LEASABLE AND LOCATABLE MINERAL REGULATIONS. Russell Moore. 1977. 67 pp.

Contains a compilation of all Federal environmental regulations, as of 15 March 1977, pertaining to Western surface mining. Minerals covered by this study include coal, oil shale, copper, uranium, bentonite, phosphate, and gypsum. (Part II is FWS/OBS-78/04.)

FWS/OBS-77/21. USER NEEDS ASSESSMENT FOR AN OPERATIONAL GEOGRAPHIC INFORMATION SYSTEM. Larry Salmen et al. 1977. 89 pp.

This publication presents the results of a 5-month survey of user needs for a geographic information system. The assessment focuses on three groups of users: Denver Region 6 FWS Offices; Region 6 Billings Area Office; and Special Projects of OBS.

FWS/OBS-77/22. A GENERAL DESIGN SCHEMA FOR AN OPERATIONAL GEOGRAPHIC INFORMATION SYSTEM. Larry Salmen et al. 1977. 49 pp.

This report presents a general system design and outlines a basic set of system capabilities for the FWS's geographic information system.

FWS/OBS-77/26. STRATEGIES FOR RESERVING FLOWS FOR FISH AND WILDLIFE: IDENTIFICATION, DESCRIPTION, AND PRELIMINARY EVALUATION. Richard L. Dewsnup et al. 1977. 706 pp.

This report contains an extensive overview of Federal laws, State laws, water quality laws, and interstate compacts as they relate to the provision of instream flows for fish and wildlife purposes.

FWS/OBS-77/27. STATE LAWS AND INSTREAM FLOWS. Richard L. Dewsnup et al. 1977. 76 pp.

This publication examines water laws regarding instream flow reservations for 13 western States. The report also identifies strategies available for reserving flows and presents in a matrix form the legal foundation for each strategy on a State-by-State basis.

FWS/OBS-77/29. PROMISING STRATEGIES FOR RESERVING INSTREAM FLOWS. Richard L. Dewsnup et al. 1977. 78 pp.

Summarizes the more important State and Federal water law concepts as they relate to reserving instream flows for fish and wildlife. More than 30 strategies for reserving instream flows within existing laws are described.

FWS/OBS-77/30. HABITAT AND POPULATION IMPROVEMENT MEASURES ACCOMPANYING WATER RESOURCE DEVELOPMENT PROJECTS. Wayne Nelson et al. 1977. 39 pp.

This publication describes successful and potentially successful habitat and population improvement measures accompanying water resource development projects, especially dams and reservoirs in the West.

FWS/OBS-77/31 to 77/35. These bibliographies contain abstracts of literature pertaining to the flora, fauna, and physical characteristics of the WELUT Ecological Test Areas in Wyoming, Montana, North Dakota, New Mexico, Utah, and Colorado.

FWS/OBS-77/31. ANNOTATED BIBLIOGRAPHY OF NATURAL RESOURCE INFORMATION: POWDER RIVER BASIN, NORTHEASTERN WYOMING/SOUTHEASTERN MONTANA. Ecology Consultants, Inc. 1977. 234 pp.

FWS/OBS-77/32. ANNOTATED BIBLIOGRAPHY OF NATURAL RESOURCE INFORMATION: SOUTHWESTERN NORTH DAKOTA. Ecology Consultants, Inc. 1977. 234 pp.

FWS/OBS-77/33. ANNOTATED BIBLIOGRAPHY OF NATURAL RESOURCE INFORMATION: NORTHWESTERN NEW MEXICO. Ecology Consultants, Inc. 1977. 150 pp.

FWS/OBS-77/34. ANNOTATED BIBLIOGRAPHY OF NATURAL RESOURCE INFORMATION: SOUTHERN UTAH. Ecology Consultants, Inc. 1977. 265 pp.

FWS/OBS-77/35. ANNOTATED BIBLIOGRAPHY OF NATURAL RESOURCE INFORMATION: NORTHWESTERN COLORADO. Ecology Consultants, Inc. 1977. 194 pp.

FWS/OBS-77/36. COOPERATIVE INSTREAM FLOW SERVICE GROUP: THE FIRST YEAR. 1977. 8 pp.

The personnel, goals, and activities of the multi-agency, multi-discipline Cooperative Instream Flow Service Group are described. Publications available from the Group are also listed.

FWS/OBS-77/38 to 77/41. These four publications pertain to the Plant Information Network (PIN). See also FWS/OBS-83/36.

FWS/OBS-77/38. THE PLANT INFORMATION NETWORK: VOLUME I, A USER'S GUIDE. Kimery C. Vories et al. 1977. 73 pp.

This handbook describes the basic philosophy of the Plant Information Network, its organization, the descriptors included, and definitions used for descriptors. Basic language used to query the database are also included.

FWS/OBS-77/39. THE PLANT INFORMATION NETWORK: VOLUME II, RECLAMATION AND PIN IN NORTHWESTERN COLORADO. Kimery Vories et al. 1977. 62 pp.

This publication is a guide to the use of PIN for information on environmental inventory, endangered plant status, and reclamation. Sample queries are included.

FWS/OBS-77/40. THE PLANT INFORMATION NETWORK: VOLUME III, RECLAMATION AND PIN IN THE POWDER RIVER BASIN OF MONTANA AND WYOMING. Kimery Vories et al. 1977. 59 pp.

This publication is a guide to the use of PIN for information on environmental inventory, endangered plant status, and reclamation. Sample queries are included.

FWS/OBS-77/41. THE PLANT INFORMATION NETWORK: VOLUME IV, A SUBJECT GUIDE AND ANNOTATED BIBLIOGRAPHY OF SELECTED LITERATURE ON LAND RECLAMATION IN WESTERN UNITED STATES. Kimery Vories et al. 1977. 75 pp.

This publication presents a subject guide and annotated bibliography of selected publications pertaining to land reclamation and rehabilitation in the West.

FWS/OBS-77/47. PROTECTING INSTREAM FLOWS UNDER WESTERN WATER LAWS: SELECTED PAPERS. IFIP No. 2. Berton Lee Lamb. 1977. 65 pp.

This publication contains papers submitted to a 1977 panel, "Protection of Instream Flow Under Western Water Law." A matrix of strategies for protecting instream flows under existing water law is included.

FWS/OBS-77/48. INTERIM HIERARCHICAL REGIONAL CLASSIFICATION SCHEME FOR COASTAL ECOSYSTEMS OF THE UNITED STATES AND ITS TERRITORIES. Terry T. Terrell. 1977. 40 pp.

This is a review of the literature on coastal ecosystem classifications. A hierarchical classification scheme is presented to be used in predicting the impact of various perturbations on coastal ecosystems.

FWS/OBS-77/49. UNOBLIGATED AND UNUTILIZED RESERVOIR STORAGE AT FEDERALLY CONTROLLED DAMS. Wayne Nelson et al. 1976. 59 pp.

This report identifies the status and amounts of unobligated and unutilized storage space in operating Federal reservoirs in the West. It also identifies legislative and administrative means for making these supplies of stored water available for fish and wildlife purposes.

FWS/OBS-77/54. COMPARISON OF SELECTED OPERATIONAL CAPABILITIES OF FIFTY-FOUR GEOGRAPHIC INFORMATION SYSTEMS. Larry Salmen et al. 1977. 30 pp.

This report presents and overview of 54 geographic information systems and their ability to meet the needs of Fish and Wildlife, Region 6, for a computer-based goegraphic information system. An appendix outlining functional criteria for software evaluation is included.

FWS/OBS-77/55. NATURAL RESOURCE GEOGRAPHIC DATA BASES FOR MONTANA AND WYOMING. Larry Salmen et al. 1977. 70 pp.

This report is the result of a survey of existing data bases for potential use by the FWS Region 6. Data bases surveyed consist mainly of spatially-oriented data that would be useful in a geographic information system for Montana and Wyoming.

FWS/OBS-77/61. AN INDEXED, ANNOTATED BIBLIOGRAPHY OF THE ENDANGERED AND THREATENED FISHES OF THE UPPER COLORADO RIVER SYSTEM. Timothy Joseph et al. 1977. 169 pp.

This bibliography emphasizes the limiting factors, habitat alteration, and numerous environmental characteristics associated with the endangered and threatened fishes of the Upper Colorado River system. Subject, geographic, and systematic indexes are included.

FWS/OBS-77/62. AN EVALUATION OF THE STATUS, LIFE HISTORY, AND HABITAT REQUIREMENTS OF ENDANGERED AND THREATENED FISHES OF THE UPPER COLORADO RIVER SYSTEM. Timothy Joseph and James A. Sinning.

This report focuses on endangered and threatened fishes and their ecosystems. The major sections of the report are abiotic components, biological components, species description, river basin description, major factors inducing environmental change, and recommended research priorities.

FWS/OBS-77/63. DEVELOPMENT AND EVALUATION OF WEIGHTED CRITERIA, PROBABILITY-OF-USE CURVES FOR INSTREAM FLOW ASSESSMENT: FISHERIES. IFIP No. 3. Ken D. Bovee et al. 1977. 53 pp.

This report describes methods and procedures for probability criteria curves. Weighted criteria are used to assess impacts of altered streamflow regimes on a stream habitat, using parameters of depth, velocity, substrate, and temperature. Guidelines for data collection, analysis, and curve development are discussed.

FWS/OBS-77/65. HABITAT REQUIREMENTS OF JUVENILE COLORADO RIVER SQUAWFISH.

This study determines the habitat requirements of several rare fishes, primarily young Colorado squawfish. The objectives of the study were to determine the physical and chemical parameters of the fish habitats, determine where spawning occurs, determine movements of size classes of rare fishes, determine the fish species associated with the study area and assess the relative importance of various river habitats.

FWS/OBS-78/02. THE PLANT INFORMATION NETWORK BROCHURE. 1978. 2 p.

This brochure describes the organization, philosophy, and statement of need for the Plant Information Network (PIN). A list of PIN descriptors and descriptor states and examples of the use of PIN are included.

FWS/OBS-78/04. AN ENVIRONMENTAL GUIDE TO WESTERN SURFACE MINING. PART TWO: IMPACTS, MITIGATION, AND MONITORING. Russell Moore and Thomas Mills. 1977. 384 p.

This guide assembles information about the effects of surface mining in the Northern Great Plains, the Rocky Mountains, and the Southwest on fish and wildlife and recommends ways to mitigate these effects. (Part one is FWS/OBS-77/20.)

FWS/OBS-78/07. PROBABILITY OF USE CRITERIA FOR THE FAMILY SALMONIDAE. IFIP NO. 4. Ken D. Bovee. 1978. 90 pp.

This report gives the probability of use criteria for the hydraulic parameters of depth, velocity, substrate, and temperature for the family Salmonidae.

FWS/OBS-78/13. AN INDEXED ANNOTATED BIBLIOGRAPHY OF THE RARE FISHES OF THE UPPER MISSOURI RIVER SYSTEM. Timothy Joseph. 1977. 282 pp.

This bibliography is Part One of a two-part study of the status, life history, and habitat requirements of rare fishes with restricted distributions in the Upper Missouri River system. Part Two is presented in FWS/OBS-78/32.

FWS/OBS-78/20. ATLAS OF WESTERN SURFACE-MINED LANDS: COAL, URANIUM AND PHOSPHATE. Kent Evans et al. 1978. 373 pp.

This is a compilation of information on mines in 11 contiguous Western States which were operating prior to 1976 and are more than 10 acres. Location, owner/operator, mining plans and methodology, reclamation plans, dates of operation, and current land conditions are included.

FWS/OBS-78/21. A SYSTEMS APPROACH TO ECOLOGICAL BASELINE STUDIES. James B. States et al. 1978. 400 pp.

This handbook is intended to help baseline study project managers and their technical staffs analyze ecosystems threatened by impacts and requiring baseline studies for environmental impact statements, post-impact monitoring programs, and reclamation plans.

FWS/OBS-78/22. BIBLIOGRAPHY OF MANUALS AND HANDBOOKS FROM NATURAL RESOURCE AGENCIES. Hubert D. Burke. 1978. 79 pp.

This bibliography supersedes FWS/OBS-77/10. It lists handbooks and manuals relating to wildlife (produced by State and Federal agencies) which are not found in libraries or information retrieval systems. The revised edition includes an agency and subject index, in addition to an expanded introductory chapter.

FWS/OBS-78/23. STREAM CLASSIFICATION 1977: PROCEEDINGS OF A WORKSHOP HELD AT PINGREE PARK, COLORADO, OCTOBER 10-13, 1977. William G. McConnell et al. 1978. 70 pp.

This workshop was designed to provide an outline for the accurate development of useful stream classifications. The three major points considered were the purposes of classification, the principles necessary to ensure the usefulness of a classification, and the processes of developing and sequencing components in a useful classification.

FWS/OBS-78/25. RESERVOIR ECOSYSTEMS AND WESTERN COAL DEVELOPMENT IN THE UPPER MISSOURI RIVER: A SUMMARY REPORT. William R. Nelson et al. 1978. 12 pp.

This report provides an overview of a one-year FWS study which evaluated the limnology, water chemistry, and fisheries of Lake Fort Peck in Montana and Lake Sakakawea in North Dakota. Descriptions of their baseline conditions, impacts of coal developments, mitigation measures, and further research needs are described.

FWS/OBS-78/26. TEXAS LIGNITE: ENVIRONMENTAL PLANNING OPPORTUNITIES. Thomas Cloud. 1978. 12 pp.

This report discusses the impacts of Texas lignite development on aquatic and terrestrial environments and recreation. Various opportunities for environmental protection measures, such as involving concerned agencies and the public in planning and the establishment of reclamation plans are also discussed.

FWS/OBS-78/32. CAPTURE LOCATIONS OF RARE FISH IN THE UPPER COLORADO RIVER SYSTEM. Ecology Consultants, Inc. 1978. 50 pp.

This is Part Two of a study (Part One is FWS/OBS-78/13) and provides information on the distribution of rare fish species in the Upper Colorado River system. Capture locations are plotted for Colorado, Utah, Wyoming, and New Mexico.

FWS/OBS-78/33. HYDRAULIC SIMULATION IN INSTREAM FLOW STUDIES: THEORY AND TECHNIQUES. IFIP NO. 5. Robert T. Milhous et al. 1978. 143 pp.

Several types of techniques for the prediction of the stage-discharge relationship and the velocity distribution-discharge relationship are presented, along with general limitations and site-imposed constraints pertaining to each type of simulation technique.

FWS/OBS-78/34. METHODS OF ASSESSING INSTREAM FLOWS FOR RECREATION. IFIP NO. 6. Ronald Hyra. 1978. 52 pp.

This paper describes two techniques for performing recreational instream flow studies. The single cross section method is discussed briefly. The majority of the paper deals with the more sophisticated incremental method of assessing instream flows. Stream flow suitability criteria for recreation are presented for both methods.

FWS/OBS-78/35 to 78/47. Each of the 12 reports in this series focuses on identifying and evaluating the most promising methods for reserving instream flows to benefit fish and wildlife in a particular Western State.

FWS/OBS-78/35. INSTREAM FLOW STRATEGIES FOR ARIZONA. Wayne Nelson et al. 1978. 100 pp.

FWS/OBS-78/36. INSTREAM FLOW STRATEGIES FOR CALIFORNIA. Wayne Nelson et al. 1978. 106 pp.

FWS/OBS-78/37. INSTREAM FLOW STRATEGIES FOR COLORADO. Wayne Nelson et al. 1978. 101 pp.

FWS/OBS-78/38. INSTREAM FLOW STRATEGIES FOR IDAHO. Wayne Nelson et al. 1978. 107 pp.

FWS/OBS-78/39. INSTREAM FLOW STRATEGIES FOR MONTANA. Wayne Nelson et al. 1978. 112 pp.

FWS/OBS-78/40. INSTREAM FLOW STRATEGIES FOR NEVADA. Wayne Nelson et al. 1978. 100 pp.

FWS/OBS-78/41. INSTREAM FLOW STRATEGIES FOR NEW MEXICO. Wayne Nelson et al. 1978. 94 pp.

FWS/OBS-78/42. INSTREAM FLOW STRATEGIES FOR NORTH DAKOTA. Wayne Nelson et al. 1978. 109 pp.

FWS/OBS-78/43. INSTREAM FLOW STRATEGIES FOR OREGON. Wayne Nelson et al. 1978. 124 pp.

FWS/OBS-78/44. INSTREAM FLOW STRATEGIES FOR SOUTH DAKOTA. Wayne Nelson et al. 1978. 107 pp.

FWS/OBS-78/45. INSTREAM FLOW STRATEGIES FOR UTAH. Wayne Nelson et al. 1978. 99 pp.

FWS/OBS-78/46. INSTREAM FLOW STRATEGIES FOR WASHINGTON. Wayne Nelson et al. 1978. 120 pp.

FWS/OBS-78/47. INSTREAM FLOW STRATEGIES FOR WYOMING. Wayne Nelson et al. 1978. 97 pp.

FWS/OBS-78/56. WESTERN RESERVOIR AND STREAM HABITAT IMPROVEMENT HANDBOOK. Wayne Nelson et al. 1978. 250 pp.

This handbook describes and evaluates the success of 286 habitat and population improvement measures that were recommended for 90 Federal dam and reservoir projects in 19 western States. All improvement measures are accompanied by engineering drawings; cost/output data; evaluation of intended purposes; inherent limitations; past performances; and actual applications.

FWS/OBS-78/59. AN APPROACH TO STREAM CLASSIFICATION. 1978.

This brochure describes FWS/OBS-78/23, STREAM CLASSIFICATION 1977.

FWS/OBS-78/60. ECOLOGICAL IMPLICATIONS OF GEOPRESSURED-GEOTHERMAL ENERGY DEVELOPMENT: TEXAS-LOUISIANA GULF COAST REGION. Thomas C. Gustavson et al. 1977. 670 pp.

This study contains two main sections in which the ramifications of the commercial development of thermal-hydraulic energy for the generation of power are reviewed from the different perspectives of the Gulf Coast region as an energy resource and as an ecological resource.

FWS/OBS-78/61. INSTREAM FLOW METHODOLOGIES FOR REGIONAL AND NATIONAL ASSESSMENT. IFIP No. 7. Keith Bayha. 1978. 98 pp.

This paper provides an indepth accounting of the effort made over a 4-year period to consider instream flow values as part of the Water Resource Council's Second National Water Assessment. It also summarizes a new method, developed subsequent to the National Assessment effort, which may provide an improved basis for assessing instream flow needs for level A and B planning studies.

FWS/OBS-78/64. MAP INDEXING SYSTEM: USERS MANUAL. Larry Salmen et al. 1978. 36 pp.

This manual describes the Map Indexing System (MIS) component of FWS geographic information system. The manual contains a general overview of MIS components, directions on using the MIS to evaluate data bases, and suggestions on where to search if data is not in the system.

FWS/OBS-78/68. RECOMMENDED STREAM RESOURCE MAINTENANCE FLOWS ON SEVEN SOUTHERN IDAHO STREAMS. IFIP NO. 8. Thomas A. Pruitt et al. 1978. 67 pp.

This paper documents the results of instream flow investigations conducted on seven southern Idaho streams during 1972-1975. The results were reanalyzed using the concept of probability-of-use curves which are based on weighted criteria for depth and velocity. Recommended stream resource maintenance flows are presented.

FWS/OBS-78/77. IMPACT PREDICTION MANUAL FOR GEOTHERMAL DEVELOPMENT. Woodward-Clyde Consultants. 1978. 200 pp.

This manual presents techniques for predicting probable effects of geothermal development on fish and wildlife resources in the West. Part one deals with the concepts underlying the manual; part two discusses cause-and-effect and describes qualitative and quantitative analysis of impacts. Appendices include an annotated bibliograpy; an example of a data collection program; a listing of endangered, threatened, and protected flora and fauna; and a supplement to erosion analysis techniques outlined in the manual.

FWS/OBS-78/86. REHABILITATION OF WESTERN WILDLIFE HABITAT: A REVIEW. Utah State University. 1978. 238 pp.

This publication provides a review of information regarding both the habitat requirements of key wildlife species and land rehabilitation techniques that have been successful. The geographic focus is on those habitats and rehabilitation efforts west of the cultivated prairies, with special emphasis placed on actual or anticipated sites of surface mining. Additional research needs are identified, as well as methods to improve the integration of habitat research and rehabilitation technology.

FWS/OBS-79/03. ELEMENTS IN NEGOTIATING STREAM FLOWS ASSOCIATED WITH FEDERAL PROJECTS. IFIP NO. 9. P. S. Wassenberg et al. 1979. 41 pp.

This report presents ideas for use in negotiations intended to solve water resource planning problems. It makes such information available to encourage discussion and exploration of the issues presented.

FWS/OBS-79/27. COOPERATIVE INSTREAM FLOW SERVICE GROUP, SEPTEMBER 1977-DECEMBER 1978. 1979. 16 pp.

This brief report is intended to serve as both an introduction to the Instream Flow Group and its second annual report. It recaps the history of the Group, its goals and activities.

FWS/OBS-79/36. PROTECTING INSTREAM FLOWS IN MONTANA: YELLOWSTONE RIVER RESERVATION CASE STUDY. IFIP NO. 10. Debra A. Sweetman. 1980. 75 pp.

The intent of this paper is to provide a review of the method utilized by the Montana Board of Natural Resources and Conservation in making the Yellowstone River reservation determinations. It also discusses the usefulness of this form of water allocation.

FWS/OBS-79/37. GUIDELINES FOR PREPARING EXPERT TESTIMONY IN WATER MANAGEMENT DECISIONS RELATED TO INSTREAM FLOW ISSUES. IFIP NO. 1 REVISED. Berton L. Lamb and Debra A. Sweetman. 1979. 33 pp.

The guidelines provide instructions and background information to biologists who believe their work may become part of a formal adjudication or administrative hearing. Topics covered include types of hearings, discovery procedures, and rules of evidence. Samples of testimony are also included. (Supersedes FWS/OBS-77/19.)

FWS/OBS-80/53. INSTREAM FLOW NEGOTIATION: REVIEW OF PRACTICES. Mary Ray White, Felix D. Valdez, and Michael D. White. 1980. 50 pp.

The different approaches to negotiations as they apply to managing instream flows are reviewed in this report. Negotiations are comprised of many factors, including debate, persuasion, cooperation, and compromise.

FWS/OBS-80/55. STREAMSIDE AREAS - MANAGEMENT DIVIDENDS. Michelle Nolde et al. 1980. 16 pp.

This nontechnical publication is aimed at stimulating interest among ranchers and landowners in improving streamside zones. It emphasizes the importance of streamside zones for fish, wildlife, and domestic livestock, and the interrelationship of those resources. Agencies that can assist landowners in developing management plans, and funding sources for implementation of the plans are also listed.

FWS/OBS-80/57. PROCEEDINGS OF THE URANIUM MINING AND MILLING WORKSHOP. Gerald C. Horak and James E. Olson. 1980. 105 pp.

The proceedings summarize a two-day workshop held on May 28-29, 1980. Participants from government agencies and the private sector presented information on their involvement with uranium development. Recommendations for Fish and Wildlife Service initiatives related to uranium development were presented and ranked.

FWS/OBS-80/58. FIELD GUIDELINES FOR USING TRANSECTS TO SAMPLE NONGAME BIRD POPULATIONS. Sharon A. Mikol. 1980. 60 pp.

Field procedures are discussed for line transect sampling to estimate the abundance of nongame birds. The methods are oriented toward habitats and species in the Northern Great Plains, but much of the information is applicable to any habitat or species. Problems in data collection are emphasized.

FWS/OBS-81/31. REACH FILE PHASE II REPORT: A STANDARDIZED METHOD FOR CLASSIFYING STATUS AND TYPE OF FISHERIES. James E. Olson, Elizabeth A. Whippo, and Gerald C. Horak. 1981. n.p.

The Reach File is a computerized catalog of the hydrological features of the United States. The file will organize and analyze water resources data and provide interpreted information concerning physical, chemical, and biological attributes of the cataloged river reaches.

The objective of Phase II was to design a standardized system for collecting information related to the type and quality of fisheries in the cataloged reaches. Fisheries type is determined by the species present, relative five abundance, habitat categorization, and other parameters. Reproductive capabilities and capacity, diversity of the fishery, and degree of contamination reflect fisheries quality in the proposed system.

FWS/OBS-81/43 (REVISED). USER'S GUIDE TO THE PHYSICAL HABITAT SIMULATION SYSTEM. Robert T. Milhous, David L. Wegner, and Terry J. Waddle. 1981. 254 pp.

The manual contains instructions and guidelines for using the Physical Habitat Simulation System (PHABSIM) developed by the Instream Flow Group, USFWS. The PHABSIM system simulates the physical habitat in relation to flow regime and physical structure of a stream and has been applied to water management and fisheries management. The manual contains specific descriptions of the theory and organization of the computer programs making up PHABSIM. Appendix material contains directions for use of particular programs or for specialized applications of the programs.

FWS/OBS-81/44. FEASIBILITY OF USING GEOTHERMAL EFFLUENTS FOR WATERFOWL WETLANDS. CH_2M Hill. 1981. 236 pp.

The feasibility of using geothermal effluent water to develop and maintain waterfowl wetlands was evaluated. The study area encompassed Idaho, Montana, Nevada, New Mexico, Northern California, Oregon, and Utah. Physical and chemical properties of effluent water were described for 206 sites in the seven States. Potential use of the sites for wetlands was evaluated to the extent possible by applying state-of-the-art water quality criteria and considering other factors including availability of land for a wetland, land use and topographic suitability for ground water contamination potential, and waterfowl use potential. Sites with the most development potential are in the Beaverhead area, the Camas area of Idaho, and the Nye area of Nevada.

FWS/OBS-81/46. DESCRIPTION AND APPLICATION OF THE STREAM SIMULATION AND ASSESSMENT MODEL VERSION IV (SSAM IV). William J. Grenney and Andrezejk Kraszewski. 1981. ___ pp.

The purpose of this report is to describe the mathematical model, the Stream Simulation and Assessment Model (SSA), used to introduce water quality aspects into the Instream Flow Group's Incremental Methodology (IFIM). This document is intended for use by aquatic biologists and water quality engineers who are experienced in water quality studies, and who need a water quality computer model. The following background information, necessary for the use of SSAM IV, is provided in the report:

1. The mathematical concepts involved in modeling water quality in stream environments.
2. A description of the computer model which incorporates these concepts and can be applied to a specific stream network.
3. A user's guide to developing the input required by the computer model.
4. Application of the model to the Yampa River system in Colorado.

FWS/OBS-81/47. ESTIMATING WILDLIFE HABITAT VARIABLES. Robert L. Hays, Cliff Summers, and William Seitz. 1981. 111 pp.

Thirty-five techniques for estimating variables commonly used as input to habitat models for terrestrial wildlife species are described. Each description includes explicit directions for use, and information about required equipment, cost to apply, accuracy, and conditions under which it is appropriate to be used. A glossary of variables is included, and cross-referenced to the appropriate techniques. No remote sensing techniques are included, but some information is provided about sources and types of images, and where to go for a discussion of remote sensing techniques.

FWS/OBS-81/48. PROCEEDINGS: WORKSHOP ON DOWNSTREAM RIVER CHANNEL CHANGES RESULTING FROM DIVERSIONS OR RESERVOIR CONSTRUCTION. D. B. Simons et al. 1981. 353 pp.

This workshop assembled 20 qualified individuals to discuss solutions to downstream problems stemming from hypothetical impoundments or diversions, or both, on three selected rivers in the West.

The proceedings of the workshop are composed of results prepared by the 20 participants along with reporters' comments and workshop summaries. These reports describe how the authors perceive the problem of river response and determine a solution to a set of hypothetical man-induced changes.

FWS/OBS-82/10, 82/10.A, and 82/10.1 to 82/10.62. This is a series of publications describing habitat requirements of selected fish and wildlife species. Numerous literature sources have been consulted in an effort to consolidate scientific data on species-habitat relationships. These data have subsequently been synthesized into subjective Habitat Suitability Index (HSI) models. The models are based on suitability indices formulated for variables found to affect the life cycle and survival of each species. The models are designed to be modified to evaluate specific habitat alterations using the HSI model building techniques presented in the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures.

FWS/OBS-82/10. HABITAT SUITABILITY INDEX MODELS: INTRODUCTION. Melvin L. Schamberger, Adrian H. Farmer, and James W. Terrell. 1982. 2 pp.

FWS/OBS-82/10.A. HABITAT SUITABILITY INDEX MODELS: APPENDIX A. GUIDELINES FOR THE RIVERINE AND LACUSTRINE APPLICATIONS OF FISH HSI MODELS WITH THE HABITAT EVALUATION PROCEDURES. James W. Terrell et al. 1982. 54 pp.

FWS/OBS-82/10.2. HABITAT SUITABILITY INDEX MODELS: CHANNEL CATFISH. Thomas E. McMahon and James W. Terrell. 1982. 29 pp.

FWS/OBS-82/10.3A. HABITAT SUITABILITY INDEX MODELS: A LOW EFFORT SYSTEM FOR PREDICTING HABITAT SUITABILITY OF PLANNED COOLWATER AND COLDWATER RESERVOIRS. (Revised). William J. McConnell, Eric P. Bergersen, and Kathryn L. Williamson. 1984. 62 pp.

A technique is described for measuring reservoir habitat suitability based on a composite score for five primary reservoir attributes (temperature, turbidity, nonliving cover, drawdown, and shallow cover frequency). The value of each primary attribute is determined from secondary attributes, which are easily obtained from published data on on-site inspection of the proposed reservoir basin. Subsequently, the use of primary attribute scores to determine reservoir habitat suitability for five selected fish species is described. The intended use is during the early planning stages of reservoir construction projects, when the outcomes of alternative plans are being evaluated.

FWS/OBS-82/10.4. HABITAT SUITABILITY INDEX MODELS: CREEK CHUB. Thomas E. McMahon. 1982. 23 pp.

FWS/OBS-82/10.5. HABITAT SUITABILITY INDEX MODELS: CUTTHROAT TROUT. Terry J. Hickman and Robert F. Raleigh. 1982. 38 pp.

FWS/OBS-82/10.6. HABITAT SUITABILITY INDEX MODELS: BLACK CRAPPIE. Elizabeth A. Edwards et al. 1982. 25 pp.

FWS/OBS-82/10.7. HABITAT SUITABILITY INDEX MODELS: WHITE CRAPPIE. Elizabeth A. Edwards et al. 1982. 22 pp.

FWS/OBS-82/10.8. HABITAT SUITABILITY INDEX MODELS: BLUEGILL. Robert J. Stuber, Glen Gebhart, and O. Eugene Maughan. 1982. 26 pp.

FWS/OBS-82/10.9. HABITAT SUITABILITY INDEX MODELS: SLOUGH DARTER. Elizabeth A. Edwards, Mary Bacteller, and O. Eugene Maughan. 1982. 13 pp.

FWS/OBS-82/10.10. HABITAT SUITABILITY INDEX MODELS: FERRUGINOUS HAWK. Thomas M. Jasikoff. 1982. 18 pp.

FWS/OBS-82/10.11 (Revised). HABITAT SUITABILITY INDEX MODELS: MARTEN. Arthur W. Allen. 1984. 13 pp.

FWS/OBS-82/10.12. HABITAT SUITABILITY INDEX MODELS: COMMON CARP. Elizabeth A. Edwards and K. Twomey. 1982. 27 pp.

FWS/OBS-82/10.13. HABITAT SUITABILITY INDEX MODELS: SMALLMOUTH BUFFALO. Elizabeth A. Edwards and K. Twomey. 1982. 28 pp.

FWS/OBS-82/10.14. HABITAT SUITABILITY INDEX MODELS: BLACK BULLHEAD. Robert J. Stuber. 1982. 25 pp.

FWS/OBS-82/10.15. HABITAT SUITABILITY INDEX MODELS: GREEN SUNFISH. Robert J. Stuber. 1982. 28 pp.

FWS/OBS-82/10.16. HABITAT SUITABILITY INDEX MODELS: LARGEMOUTH BASS. Robert J. Stuber, Glen Gebhart, and O. Eugene Maughan. 1982. 32 pp.

FWS/OBS-82/10.17. HABITAT SUITABILITY INDEX MODELS: NORTHERN PIKE. Peter D. Inskip. 1982. 40 pp.

FWS/OBS-82/10.18. HABITAT SUITABILITY INDEX MODELS: FOX SQUIRREL. Arthur W. Allen. 1982. 11 pp.

FWS/OBS-82/10.19. HABITAT SUITABILITY INDEX MODELS: GRAY SQUIRREL. Arthur W. Allen. 1982. 11 pp.

FWS/OBS-82/10.22. HABITAT SUITABILITY INDEX MODELS: VEERY. Patrick J. Sousa. 1982. 12 pp.

FWS/OBS-82/10.24. HABITAT SUITABILITY INDEX MODELS: BROOK TROUT. Robert F. Raleigh. 1982. 42 pp.

FWS/OBS-82/10.25. HABITAT SUITABILITY INDEX MODELS: REGRESSION MODELS BASED ON HARVEST OF COOLWATER AND COLDWATER FISHES IN RESERVOIRS. Larry R. Aggus and William M. Bivin. 1982. 38 pp.

This report presents methods designed to permit habitat classification of reservoirs that contain coolwater, coldwater, and seasonal two-story fisheries. Multiple regression equations describing relations between reservoir environmental characteristics and biomass harvest of selected sport fish species or groups are presented. Cumulative frequency plots of known harvest estimates from the various classes of reservoirs are presented to facilitate conversion of harvest predictions to Habitat Suitability Indices (HSI's). Detailed descriptions and limitations of the procedures are discussed.

FWS/OBS-82/10.26. HABITAT SUITABILITY INDEX MODELS: YELLOW-HEADED BLACKBIRD. Richard L. Schroeder. 1982. 11 pp.

FWS/OBS-82/10.27. HABITAT SUITABILITY INDEX MODELS: YELLOW WARBLER. Richard L. Schroeder. 1982. 7 pp.

FWS/OBS-82/10.28. HABITAT SUITABILITY INDEX MODELS: PINE WARBLER. Richard L. Schroeder. 1982. 7 pp.

FWS/OBS-82/10.29. HABITAT SUITABILITY INDEX MODELS: EASTERN MEADOWLARK. Richard L. Schroeder and Patrick J. Sousa. 1982. 9 pp.

FWS/OBS-82/10.30 (Revised). HABITAT SUITABILITY INDEX MODELS: BEAVER. Arthur W. Allen. 1983. 19 pp.

FWS/OBS-82/10.32. HABITAT SUITABILITY INDEX MODELS: LEWIS' WOODPECKER. Patrick J. Sousa. 1983. 14 pp.

FWS/OBS-82/10.33. HABITAT SUITABILITY INDEX MODELS: LONGNOSE DACE. Elizabeth A. Edwards. 1983. 13 pp.

FWS/OBS-82/10.34. HABITAT SUITABILITY INDEX MODELS: BIGMOUTH BUFFALO. Elizabeth A. Edwards. 1983. 23 pp.

FWS/OBS-82/10.35. HABITAT SUITABILITY INDEX MODELS: LONGNOSE SUCKER. Elizabeth A. Edwards. 1983. 21 pp.

FWS/OBS-82/10.36. HABITAT SUITABILITY INFORMATION: SMALLMOUTH BASS. Elizabeth A. Edwards, Glen Gebhart, and O. Eugene Maughan. 1983. 47 pp.

FWS/OBS-82/10.37. HABITAT SUITABILITY INDEX MODELS: BLACK-CAPPED CHICKADEE. Richard L. Schroeder. 1983. 12 pp.

FWS/OBS-82/10.38. HABITAT SUITABILITY INDEX MODELS: DOWNY WOODPECKER. Richard L. Schroeder. 1983. 10 pp.

FWS/OBS-82/10.39. HABITAT SUITABILITY INDEX MODELS: PILEATED WOODPECKER. Richard L. Schroeder. 1983. 15 pp.

FWS/OBS-82/10.40. HABITAT SUITABILITY INFORMATION: COMMON SHINER. James G. Trial et al. 1983. 22 pp.

FWS/OBS-82/10.41. HABITAT SUITABILITY INFORMATION: BLACKNOSE DACE. James G. Trial et al. 1983. 26 pp.

FWS/OBS-82/10.42. HABITAT SUITABILITY INDEX MODELS: SOUTHERN RED-BACKED VOLE (WESTERN UNITED STATES). Arthur W. Allen. 1983. 14 pp.

FWS/OBS-82/10.43. HABITAT SUITABILITY INDEX MODELS: WOOD DUCK. Patrick J. Sousa and Adrian H. Farmer. 1983. 27 pp.

FWS/OBS-82/10.44. HABITAT SUITABILITY INDEX MODELS: BAIRD'S SPARROW. Patrick J. Sousa and W. Neil McDonal. 1983. 12 pp.

FWS/OBS-82/10.45. HABITAT SUITABILITY INDEX MODELS: FISHER. Arthur W.Allen. 1983. 19 pp.

FWS/OBS-82/10.46. HABITAT SUITABILITY INDEX MODELS: MUSKRAT. Arthur W. Allen and Robert D. Hoffman. 1984. 27 pp.

FWS/OBS-82/10.47. HABITAT SUITABILITY INDEX MODELS: WILLIAMSON'S SAPSUCKER. Patrick J. Sousa. 1983. 13 pp.

FWS/OBS-82/10.48. HABITAT SUITABILITY INFORMATION: FALLFISH. James G. Trial. 1983. 15 pp.

FWS/OBS-82/10.49. HABITAT SUITABILITY INDEX MODELS: COHO SALMON. Thomas E. McMahon. 1983. 29 pp.

FWS/OBS-82/10.55. HABITAT SUITABILITY INFORMATION: YELLOW PERCH. Douglas A. Krieger, James W. Terrell, and Patrick C. Nelson. 1983. 37 pp.

FWS/OBS-82/10.56. HABITAT SUITABILITY INFORMATION: WALLEYE. Thomas E. McMahon, James W. Terrell, and Patrick C. Nelson. 1984. 43 pp.

FWS/OBS-82/10.60. HABITAT SUITABILITY INFORMATION: RAINBOW TROUT. Robert F. Raleigh et al. 1983. 63 pp.

FWS/OBS-82/10.61. HABITAT SUITABILITY INDEX MODELS: Mink. Arthur W. Allen. 1983. 19 pp.

FWS/OBS-82/10.62. HABITAT SUITABILITY INDEX MODELS: FIELD SPARROW. Patrick J. Sousa. 1983. 14 pp.

FWS/OBS-82/10.63. HABITAT SUITABILITY INDEX MODELS: BLACK BRANT. Richard L. Schroeder. 1984. 11 pp.

FWS/OBS-82/10.64. HABITAT SUITABILITY INDEX MODELS AND INSTREAM FLOW SUITABILITY CURVES: WHITE SUCKER. Kathleen A. Twomey, Kathryn L. Williamson, and Patrick C. Nelson. 1984. 56 pp.

FWS/OBS-82/10.65. HABITAT SUITABILITY INDEX MODELS: PRONGHORN. Arthur W. Allen, John G. Cook, and Michael J. Armbruster. 1984. 22 pp.

FWS/OBS-82/10.66. HABITAT SUITABILITY INDEX MODELS: EASTERN COTTONTAIL. Arthur W. Allen. 1984. 28 pp.

FWS/OBS-82/10.67. HABITAT SUITABILITY INDEX MODELS: WARMOUTH. Thomas E. McMahon, Glen Gebhart, and O. Eugene Maughan. 1984. 20 pp.

FWS/OBS-82/10.69. HABITAT SUITABILITY INDEX MODELS: WESTERN GREBE. Henry L. Short. 1984. 20 pp.

FWS/OBS-82/10.70. HABITAT SUITABILITY INDEX MODELS: THE ARIZONA GUILD AND LAYERS OF HABITAT MODELS. Henry L. Short. 1984. 36 pp.

FWS/OBS-82/10.71. HABITAT SUITABILITY INDEX MODELS AND INSTREAM FLOW SUITABILITY CURVES: BROWN TROUT. In preparation.

FWS/OBS-82/10.72. HABITAT SUITABILITY INDEX MODELS AND INSTREAM FLOW SUITABILITY CURVES: SPOTTED BASS. Thomas E. McMahon, Glen Gebhart, O. Eugene Maughan, and Patrick C. Nelson. 1984. 41 pp.

FWS/OBS-82/10.79. HABITAT SUITABILITY INDEX MODELS AND INSTREAM FLOW SUITABILITY CURVES: REDEAR SUNFISH. Kathleen A. Twomey and Patrick C. Nelson. 1984. 29 pp.

FWS/OBS-82/10.80. HABITAT SUITABILITY INDEX MODELS AND INSTREAM FLOW SUITABILITY CURVES: PADDLEFISH. Wayne A. Hubert, Stanley H. Anderson, Peter D. Southall, and Johnie H. Crance. 1984. 32 pp.

FWS/OBS-82/10.81. HABITAT SUITABILITY INDEX MODELS: BLUE GROUSE. Richard L. Schroeder. 1984. 20 pp.

FWS/OBS-82/10.82. HABITAT SUITABILITY INDEX MODELS: CANVASBACK (BREEDING HABITAT). Richard L. Schroeder. 1984. 16 pp.

FWS/OBS-82/10.83. HABITAT SUITABILITY INDEX MODELS: BREWER'S SPARROW. Henry L. Short. 1984. 16 pp.

FWS/OBS-82/10.84. HABITAT SUITABILITY INDEX MODELS: LAKE TROUT (EXCLUSIVE OF THE GREAT LAKES). Michael D. Marcus, Wayne A. Hubert, and Stanley H. Anderson. 1984. 12 pp.

FWS/OBS-82/10.85. HABITAT SUITABILITY INDEX MODELS AND INSTREAM FLOW SUITABILITY CURVES: INLAND STOCKS OF STRIPED BASS. Thomas E. McMahon, Glen Gebhart, O. Eugene Maughan, and Patrick C. Nelson. 1984. 41 pp.

FWS/OBS-82/26. A GUIDE TO STREAM HABITAT ANALYSIS USING THE INSTREAM FLOW INCREMENTAL METHODOLOGY. IFIP NO. 12. Ken D. Bovee. 1982. 248 pp.

This manuscript consists of two parts. Part I describes the methodological design, project scoping and site selection procedures, analytical sequences to solve various instream flow and project impact problems, and the various techniques for compiling, displaying, and interpreting the results of a study. Part II contains techniques for assembling hydrological data and anticipating channel changes due to a change in flow regime or sediment yield, methods of simulating physical microhabitat conditions at different streamflows, and an overview of channel modifications to increase habitat availability.

FWS/OBS-82/29. GROWING COLORADO PLANTS FROM SEED: A STATE OF THE ART. VOLUME II: GRASSES AND GRASSLIKE PLANTS. Timothy E. Fulbright, Edward F. Redente, and Norman E. Hargis. 1982. 113 pp.

This report summarizes published information concerning seed procurement, pretreatment, laboratory germination and cultural practices for growing native and naturalized species of grass in Colorado. Also included are literature citations, a list of Colorado grasses that have been evaluated by the USDA Soil Conservation Service Plant Materials Centers, a list of varieties and cultivars released by the plant materials centers, and addresses of plant materials centers in the West. (Volume III is FWS/OBS-82/30. Volume I was published by the U.S. Forest Service.)

FWS/OBS-82/30. GROWING COLORADO PLANTS FROM SEED: A STATE OF THE ART. VOLUME III: FORBS. Edward F. Redente, Phillip R. Ogle, and Norman E. Hargis. 1982. 141 pp.

This report summarizes published information concerning seed procurement, pretreatment, laboratory germination and cultural practices for growing 442 native and naturalized forb species in Colorado. Also included are 199 literature citations, a list of Colorado forbs that have been evaluated by USDA Soil Conservation Service Plant Materials Centers, and addresses of plant materials centers in the West. (Volume II is FWS/OBS-82/29. Volume I was published by the U.S. Forest Service.)

FWS/OBS-82/31. MAPS OF DISTRIBUTION AND ABUNDANCE OF SELECTED SPECIES OF BIRDS ON UNCULTIVATED NATIVE UPLAND GRASSLANDS AND SHRUBSTEPPE IN THE NORTHERN GREAT PLAINS. Harold A. Kantrud. 1982. 31 pp.

Recent information on areas of abundance of some important species of avifauna which use grasslands is included in this report. The study area includes portions of Montana, Wyoming, Colorado, North Dakota, South Dakota, and Nebraska. Twenty distribution maps for individual species are included.

FWS/OBS-82/33 to 82/35, 83/02, 83/07, 83/18, and 83/20 to 83/22. This series of publications, focusing on selected western and midwestern States, provides a survey of State prerogatives which may be used, or have been used, to protect instream uses of water. Fish and wildlife uses of instream flows are emphasized. Many of the publications also cover use of instream flows for hydroelectric power production, recreation, navigation, downstream delivery, and waste load assimilation. These reports provide overviews of potential opportunities for preserving instream flows within the context of existing State laws and regulations.

FWS/OBS-82/33. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN ALASKA. Mary Ray White. 1982. 30 pp.

FWS/OBS-82/34. PROTECTING INSTREAM FLOWS IN CALIFORNIA: AN ADMINISTRATIVE CASE STUDY. IFIP NO. 14. Stewart W. Olive. 1982. 32 pp.

FWS/OBS-82/35. PROTECTING INSTREAM FLOWS IN IDAHO: AN ADMINISTRATIVE CASE STUDY. IFIP NO. 15. Stewart W. Olive. 1982. 30 pp.

FWS/OBS-82/38. FISH RADIOTELEMETRY: THEORY AND APPLICATION FOR HIGH CONDUCTIVITY RIVERS. Harold M. Tyus. 1982. 26 pp.

Theoretical and applied information about radiotelemetry related to rivers with high conductivity is presented in this report. Theoretical information is presented in a simplified form for investigators new to the radiotelemetry field. Radiotelemetry and ultrasoncis are compared as methods for obtaining information about fish movements in turbulent, turbid river systems. Results from field studies were used to evaluate the reception of radio transmissions from fish under natural conditions.

FWS/OBS-82/56. ECOLOGY AND CULTURE OF SELECTED SPECIES USEFUL IN REVEGETATING DISTURBED LANDS IN THE WEST. Clinton H. Wasser. 1982. 347 pp.

Ecological information about 98 species commonly used in revegetation and reclamation projects in the western United States is included in this handbook. Each species is illustrated, and its description includes information on origin, species growth, morphological characteristics, culture, management uses and techniques, associated species, pests and diseases, and improved varieties.

FWS/OBS-83/02. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN NEBRASKA AND KANSAS. J. David Aiken. 1983. 57 pp.

See series abstract above.

FWS/OBS-83/07. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN MINNESOTA AND IOWA. J. David Aiken. 1983. 64 pp.

See series abstract above.

*FWS/OBS-83/08 to 83/12. These handbooks contain information on the best current practices to minimize disturbances and adverse impacts of surface mining on fish and wildlife resources. Current State and Federal legislation was reviewed to determine those practices which were most compatible with the best technology currently available, fish and wildlife plans, and reclamation plans for specific regions of the U.S. The information presented includes risks, limitations, approximate costs, and maintenance and management requirements if each practice. Plans for the restoration of specific habitats, according to the best current practices, are also included. *

FWS/OBS-83/08. PRACTICES FOR PROTECTING AND ENHANCING FISH AND WILDLIFE ON COAL SURFACE-MINED LAND IN CENTRAL AND SOUTHERN APPALACHIA. Richard E. Ambrose, C. R. Hinkle, and C. R. Wenzel. 1983. 208 pp.

FWS/OBS-83/09. PRACTICES FOR PROTECTING AND ENHANCING FISH AND WILDLIFE ON COAL SURFACE-MINED LAND IN THE GREEN RIVER-HAMS FORK REGION. Bettina R. Proctor et al. 1983. 242 pp.

FWS/OBS-83/10. PRACTICES FOR PROTECTING AND ENHANCING FISH AND WILDLIFE ON COAL SURFACE-MINED LAND IN THE POWDER RIVER-FORT UNION REGION. Bettina R. Proctor et al. 1983. 246 pp.

FWS/OBS-83/11. PRACTICES FOR PROTECTING AND ENHANCING FISH AND WILDLIFE ON COAL SURFACE-MINED LAND IN THE SOUTHCENTRAL U.S. Richard E. Ambrose, C. R. Hinkle, and C. R. Wenzel. 1983. 229 pp.

FWS/OBS-83/12. PRACTICES FOR PROTECTING AND ENHANCING FISH AND WILDLIFE ON COAL MINED LAND IN THE UINTA-SOUTHWESTERN UTAH REGION. Bettina R. Proctor et al. 1983. 250 pp.

FWS/OBS-83/13. IDENTIFICATION OF INSTREAM HAZARDS TO TROUT HABITAT QUALITY IN WYOMING. Morris M. Skinner and Michael D. Stone. 1983. 69 pp.

Trout habitat quality can be affected by numerous physical, chemical, and biological features. Ten instream hazards, both natural and man caused, which may adversely affect trout habitat quality in western States were identified in this report. Color infrared aerial photography was used to identify specific hazards along reaches of several Wyoming rivers, and verified by on-site visits. Techniques for mitigating potential and existing hazards are presented.

FWS/OBS-83/18. PROTECTING INSTREAM FLOWS IN IOWA: AN ADMINISTRATIVE CASE STUDY. Stewart W. Olive. 1983. 35 pp.

See series abstract on p. 20.

FWS/OBS-83/20. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN GEORGIA. Terry Ehrlich. 1983. 28 pp.

See series abstract on p. 20.

FWS/OBS-83/21. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN MICHIGAN AND WISCONSIN. Mary Ray White. 1983. 73 pp.

See series abstract on p. 20.

FWS/OBS-83/22. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN TEXAS, OKLAHOMA, AND ARKANSAS. Mary Ray White. 1983. 94 pp.

See series abstract on p. 20.

FWS/OBS-83/27. HUMAN DEMOGRAPHIC IMPACTS ON FISH AND WILDLIFE RESOURCES FROM ENERGY DEVELOPMENT IN RURAL WESTERN AREAS. Margaret G. Thomas. 1983. 357 pp.

This workbook provides a mechanism for analysis of human demographic impacts on fish and wildlife due to large-scale energy developments in Western States. It focuses on impacts related to land use conversions and the accompanying reduction in quantity or quality of habitat and on impacts related to population growth and their demands or impacts on fish and wildlife resources. The workbook suggests procedures for projecting impacts on fish and wildlife resources, provides guidance on monetary valuation of resources potentially lost, and describes mitigation or enhancement measures. The intended users are developers, resource managers, and planners. The workbook was designed for use with proposed coal or oil shale projects, but other energy development projects can be evaluated if projected work force requirements are known.

FWS/OBS-83/28. PLAYA WETLANDS AND WILDLIFE ON THE SOUTHERN GREAT PLAINS: A CHARACTERIZATION OF HABITAT. R. Wayne Nelson, William J. Logan, and Emily C. Weller. 1983. 163 pp.

This characterization incorporates recent research findings in a synthesis of knowledge about the habitat values of playa wetlands to migratory and resident wildlife. Variables which may affect the value of playa wildlife habitat included watershed size and the water surface area and depth; type, height, density, and interspersion of vegetation, and the extent of emergent vegetation; land use, particularly grazing and cultivation; and the extent of modification, particularly excavating and diking. The Southern Great Plains playa wetland region encompasses parts of the Texas Panhandle, adjacent eastern New Mexico, the Oklahoma Panhandle, southwestern Kansas, and southeastern Colorado.

FWS/OBS-83/29. PLAYA WETLANDS AND WILDLIFE ON THE SOUTHERN GREAT PLAINS: A GUIDE TO HABITAT MANAGEMENT. R. Wayne Nelson, William J. Logan, and Emily C. Weller. 1983. 99 pp.

This report describes management techniques that can be implemented on playa wetlands of the Southern Great Plains to make them more attractive to wildlife and fish. Most techniques can be implemented in conjunction with other farm and ranch operations. In fact, some techniques require the use of agricultural practices to accomplish management objectives. The report is aimed at the wildlife manager, the landowner, and the sportsman. It is the purpose of the report to suggest management options, describe management techniques, and discuss potential costs and benefits of managing playas for wildlife and fish.

FWS/OBS-83/33. FIELD METHODS AND STATISTICAL ANALYSES FOR MONITORING SMALL SALMONID STREAMS. Carl L. Armour, Kenneth P. Burnham, and William S. Platts. 1983. 200 pp.

This publication contains information pertaining to monitoring programs which may be used to evaluate the effects of land use practices on small salmonid streams in the western United States. Information includes an approach for designing a monitoring program, variables which may be used with field measurement techniques, and statistical tests for evaluating data.

FWS/OBS-83/35. IMPACTS OF COAL SURFACE MINING ON 25 MIGRATORY BIRD SPECIES OF HIGH FEDERAL INTEREST. Judith S. Armbruster, ed. 1983. 348 pp.

Potential impacts of coal surface mining on 25 migratory birds of high Federal interest are examined. Literature searches on each species have been used to develop individual species accounts. Information on species distribution, life history, habitat requirements, population status, effects of disturbance, and management techniques are included. Potential impacts from coal surface mining, recommendations for mitigation measures, and habitat reclamation suggestions are also presented.

FWS/OBS-83/36. THE PLANT INFORMATION NETWORK (PIN) DATABASE: COLORADO, MONTANA, NORTH DAKOTA, UTAH, AND WYOMING. Phillip L. Dittberner and Michael R. Olson. 1984. 786 pp.

This publication provides introductory information on the Plant Information Network (PIN) and a print-out of PIN data. The PIN was a computerized data base containing information on native and naturalized vascular plants of five western States. Information was included on over 5,000 species found in Colorado, Montana, North Dakota, Utah, and Wyoming. Because of funding restrictions PIN is no longer operated as a computerized data base. This publication makes the PIN data available to resource managers, planners, and others who have a continuing need for this information.

FWS/OBS-84/01. FEASIBILITY OF USING OIL SHALE WASTEWATER FOR WATERFOWL WETLANDS. Bruce D. Snyder and Janet L. Snyder. 1984. 290 pp.

This study evaluated the use of selected wastewaters from oil shale development to establish wetland habitats for waterfowl. It also evaluated the capacity of the wetlands as an innovative wastewater treatment system. Minimum standards for water quality and quantity, and a comparison of the cost and effectiveness of wetland wastewater treatment vs. conventional treatment technologies were two of the study results.

FWS/OBS-84/03. UTILIZATION OF SURFACE COAL MINE WASTEWATER FOR CONSTRUCTION OF A NORTHERN PIKE SPAWNING/REARING MARSH. Richard W. Gregory, Allen A. Elser, and Thomas Lenhart. 1984. 44 pp.

This report describes one example where wastewater from an energy development site (coal mine operation) was used to enhance the fisheries of an adjacent reservoir. The details of this report provide an example of what considerations may be necessary for similar projects; illustrate potential problem areas in the planning, construction, and operation of such a project; and stimulate ideas for developing other innovative uses of wastewater for fish and wildlife habitat enhancement.

FWS/OBS-84/06, 84/07, and 84/14. These three volumes document the initial findings, survey design, and survey protocol of the 1982 National Fisheries Survey. The survey was conducted to provide statistically valid data on the status of fish communities in the United States, and, as such, represents a baseline assessment of the biological quality of the Nation's waters.

FWS/OBS-84/06. 1982 NATIONAL FISHERIES SURVEY. VOLUME I. TECHNICAL REPORT: INITIAL FINDINGS. Robert D. Judy, Jr., Paul N. Seeley, Thomas M. Murray, Susan C. Svirsky, Molly R. Whitworth, and Lee S. Ischinger. 1984. 140 pp.

FWS/OBS-84/07. 1982 NATIONAL FISHERIES SURVEY. VOLUME III. SURVEY PROTOCOL. Robert D. Judy, Jr. and Paul N. Seeley. 1984. 43 pp.

FWS/OBS-84/08. CONDUCTING A FERC ENVIRONMENTAL ASSESSMENT: A CASE STUDY AND RECOMMENDATIONS FROM THE TERROR LAKE PROJECT. Stewart W. Olive and Berton L. Lamb. 1984. 62 pp.

This publication discusses the negotiations surrounding the licensing of a hydroelectric power plant facility on Kodiak Island. The focus is on the interactions of the Federal Energy Regulatory Commission (FERC), the U.S. Fish and Wildlife Service, State agencies, and private interests. Recommendations and strategies for conducting successful negotiations of this kinds are provided.

FWS/OBS-84/11. COMPARISON OF THE USE OF THE HABITAT EVALUATION PROCEDURES (HEP) AND THE INSTREAM FLOW INCREMENTAL METHODOLOGY (IFIM) IN AQUATIC ANALYSES. Carl. L. Armour, Richard J. Fisher, and James W. Terrell. 1984. 30 pp.

The Habitat Evaluation Procedures are designed for quantifying habitat values and documenting impacts of habitat changes on fish and wildlife resources in both aquatic and terrestrial ecosystems. The Instream Flow Incremental Methodology is specifically designed for simulating and quantifying impacts of changes in flow, channel morphology, or water quality on fish, invertebrates, and instream recreational activities. This paper explains: (1) differentiating features and recommended uses of the two methods for environmental assessment; and (2) development and use of Suitability Index (SI) curves.

FWS/OBS-84/12. PROCEEDINGS OF THE NATIONAL WETLAND VALUES ASSESSMENT WORKSHOP. J. Henry Sather and Patricia J. Ruta Stuber, tech. coord. 1984. 100 pp.

This summarizes information resulting from the Wetland Values Assessment Workshop held in Alexandria, VA from May 23-25, 1983. Forty wetlands experts from 17 sponsoring agencies discussed wetland value assessment, focusing on the method for wetland functional assessment recently prepared for the Federal Highway Administration. The workshop resulted in the development of a National Wetlands Values Assessment Methodology which incorporates food chain, socio-economic, hydrology, habitat, and water quality values of wetlands.

FWS/OBS-84/14. 1982 NATIONAL FISHERIES SURVEY. VOLUME II: SURVEY DESIGN. W. D. Glauz. 77 pp.

See series abstract on p. 25.

FWS/OBS-84/15. INSTREAM WATER TEMPERATURE MODEL. IFIP 16. Fred D. Theurer, Kenneth A. Voos, and William J. Miller. 1984. 320 pp.

This water temperature model is designed to predict instream water temperatures based on either historical or synthetic hydrological, meteorological, and stream geometry conditions. The model is applicable to any size watershed or river basin.

FWS/OBS-84/16. A FRAMEWORK FOR ASSESSING THE IMPACTS OF ACIDIC DEPOSITION ON FOREST AND AQUATIC RESOURCES: RESULTS OF A WORKSHOP FOR THE NATIONAL ACID PRECIPITATION ASSESSMENT PROGRAM. James E. Roelle, Austin K. Andrews, Gregor T. Auble, David B. Hamilton, Richard L. Johnson, and James F. Sisler. 1984. 80 pp.

The National Acid Precipitation Assessment Program has planned a series of assessments to analyze the costs and benefits of various approaches to deal with the impacts of acidic deposition. The first of these assessments, to be completed in 1985, will focus on the extent of current damages (both physical and economic) due to acidic deposition. This report describes the results of a planning workshop, held in April 1983, whose purpose was to define the objectives of 1985 assessment with respect to forest and aquatic resources, and to achieve a common understanding among participants regarding alternative assessment approaches.

FWS/OBS-84/17. MAP PROJECTIONS FOR USE WITH THE GEOGRAPHIC INFORMATION SYSTEM. John E. Lee and J. Michael Walsh. 1984. 60 pp.

This document has been prepared to assist users of the Geographic Information System (GIS) in understanding and using the various map projections which are available. Currently, 20 map projections may be used in the GIS.

FWS/OBS-84/18. AN OVERVIEW OF MAJOR WETLAND FUNCTIONS AND VALUES. J. Henry Sather and R. Daniel Smith. 1984. 75 pp.

This report was prepared to provide background information for participants at the National Wetland Values Assessment Workshop held at Alexandria, Virginia, in May 1983. Workshop proceedings have been published as: Sather, J. Henry and Patricia J. Ruta Stuber. 1984. Proceedings of the National Wetland Assessment Workshop. FWS/OBS-84/12. 100 pp.

FWS/OBS-84/19. PHYSICAL IMPACTS OF SMALL-SCALE HYDROELECTRIC FACILITIES AND THEIR EFFECTS ON FISH AND WILDLIFE. Haydon Rochester, Jr., Thomas Lloyd, and Martha Farr. 1984. 191 pp.

This manual provides an introduction to small-scale hydroelectric (< 30 MW) technology, and its impacts on fish and wildlife and their habitats, for fisheries or wildlife biologists or other nonengineer readers. The text emphasizes the technical aspects of small-scale hydro, with a very limited discussion of institutional, social, legal, and economic factors.

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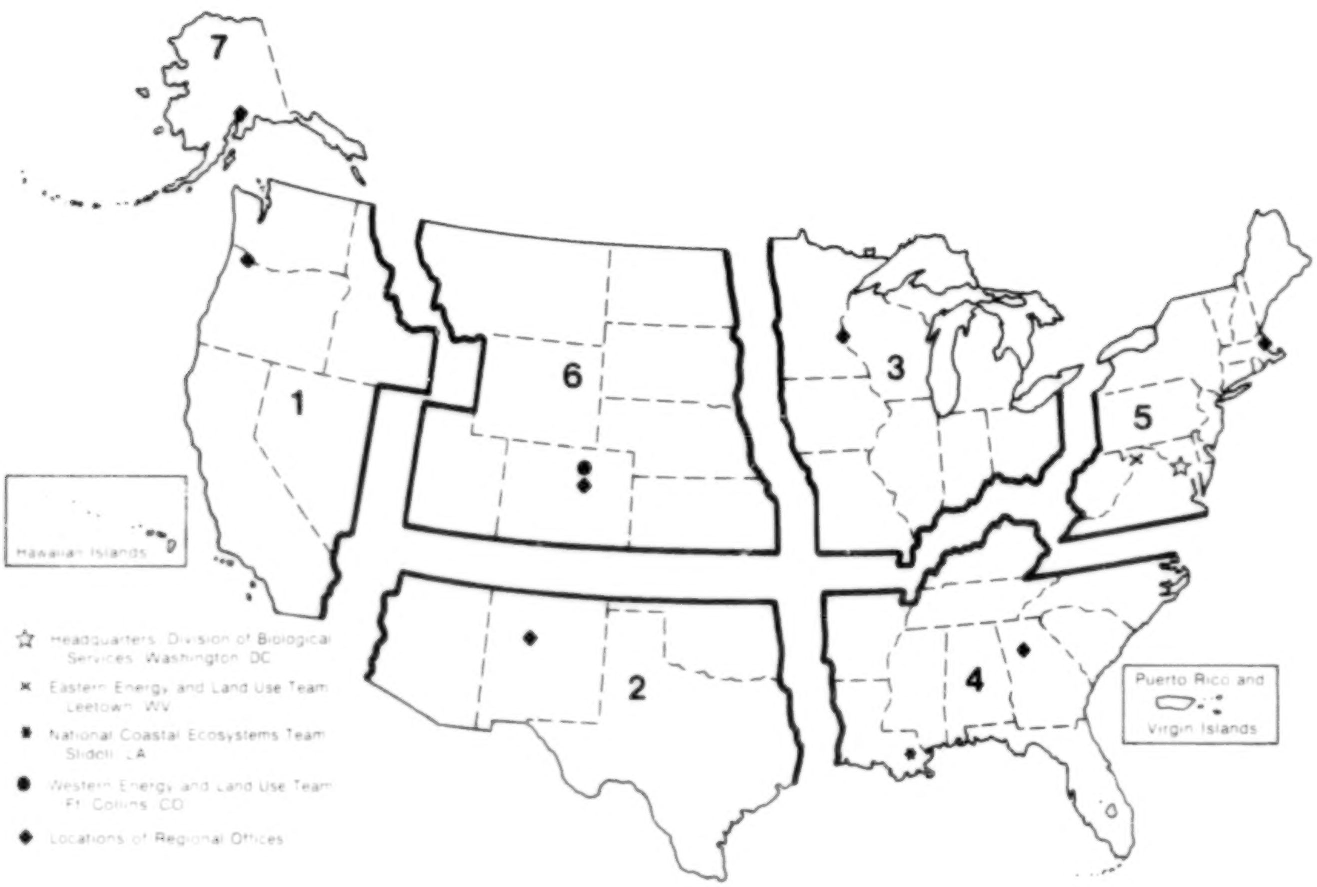
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